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DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36360

STEBG-TD

JAN 14 1967

SUBJECT: Letter Report, Product Improvement Test of UH-1D Main
Rotor Grip Seals, RDT&E Project No.
USATECOM Project No. 4-5-0151-10

TO: See Distribution

Letter rept.

14 Jan 67

OCT 20 1966

1. References.

a. Letter, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 27 January 1965, subject: "Test Directive, USATECOM Project No. 4-5-0151-(), Product Improvement Test, UH-1D Items," as amended 15 September 1965.

b. Plan of Test, USATECOM Project No. 4-5-0151-(), "Product Improvement Test of UH-1D Helicopter," US Army Aviation Test Board, 5 March 1965.

c. Letter, SMOSM-EAA, Headquarters, US Army Aviation Materiel Command, 29 December 1965, subject: "Product Improvement Test Main Rotor Grip Seals."

d. Project Transcript Sheet, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 4 January 1966, "USATECOM Project No. 4-5-0151-10, UH-1D Items, Main Rotor Grip Seals"

e. Message, AMSAV-EAA-8-1368, Commanding General, US Army Aviation Materiel Command, 19 August 1966, subject: "Product Improvement Test Main Rotor Grip Seals."

f. Message, STEBG-TP-A-8-66, US Army Aviation Test Board, 23 August 1966, subject: "Product Improvement Test Main Rotor Grip Seals."

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g. Letter, AMCPM-IRFO-T, US Army Materiel Command Field Office, 3 November 1966, subject: "USATECOM Project No. 4-5-0151-10, UH-1D Main Rotor Grip Seals."

h. Iroquois Test Coordination Meeting, 6 December 1966.

i. Telephone conversation, 27 January 1967, Mr. Henthorne, AMCPM-IR, Headquarters, US Army Materiel Command, and Mr. Key, STEBG-TD-LA, US Army Aviation Test Board, subject: "Termination of the Test on UH-1D Main Rotor Grip Seals."

j. Engineering Change Proposal UH-1B/D/E/F-236, "Modified Main Rotor Grip Seals," Bell Helicopter Company.

2. Background.

Since the beginning of the UH-1 series helicopter, oil leakage around the main rotor grip seals has been a constant service problem. The seals have been modified three different times in an attempt to correct this problem. In February 1965, USAAVCOM approved PIP Task 5B5 with the objective of eliminating the problem. This task resulted in Engineering Change Proposal UH-1B/D/E/F-236. USAAVCOM requested through USATECOM that the USAAVNTBD test the modified seal configuration specified in the ECP. For direct comparison between the standard and the modified seal configurations, the modified seal was installed on one side of a UH-1D main rotor hub and the other side of the hub was left in the standard configuration.

3. Description of Materiel.

One side of the modified main rotor hub, P/N 204-012-101-1, contains a P/N MS29561-240 "O" ring on the inboard fitting, a P/N MS29561-237 "O" ring on the outboard fitting, aluminum caps to the strap pins, and a radius ring containing a rubber shield to protect the grip seal. The other side of this hub was the same as a standard, 48-foot rotor, UH-1D hub, P/N 204-012-101. (See attached photograph.)

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4. Test Objective.

To determine the suitability of the modified UH-1D main rotor grip seal to prevent oil leakage.

5. Method.

The modified main rotor hub was installed on a UH-1D Helicopter and operated for 576.5 hours, at which time the hub was removed due to an aircraft incident. The seals were inspected throughout this period on a scheduled and an as-necessary basis for oil leakage. All oil leaks were noted. The operating time for all the standard seals removed was recorded. The capabilities of the modified seal and standard seal to prevent oil leakage were compared.

6. Summary of Results.

a. The test seals completed 576.5 hours operating time without any leakage or difficulties.

b. The standard seals had to be replaced twice during the 576.5 operating hours for excessive leakage. One seal accumulated 348.8 hours and the other accumulated 77.8 hours.

c. In comparison the test seals were far superior to the standard seals in preventing oil leakage.

d. Disassembly and inspection of the main rotor hub revealed no evidence of corrosion or thread galling in the acorn nut.

7. Conclusion.

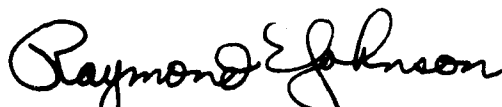
During the test period, the test seal eliminated the oil leakage problem.

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8. Recommendations. It is recommended that:

- a. The production main rotor hub incorporate the modified seals.
- b. An MWO be initiated in accordance with ECP UH-1B/D/E/F-236 at the earliest possible date for incorporation at the next scheduled or unscheduled seal change.

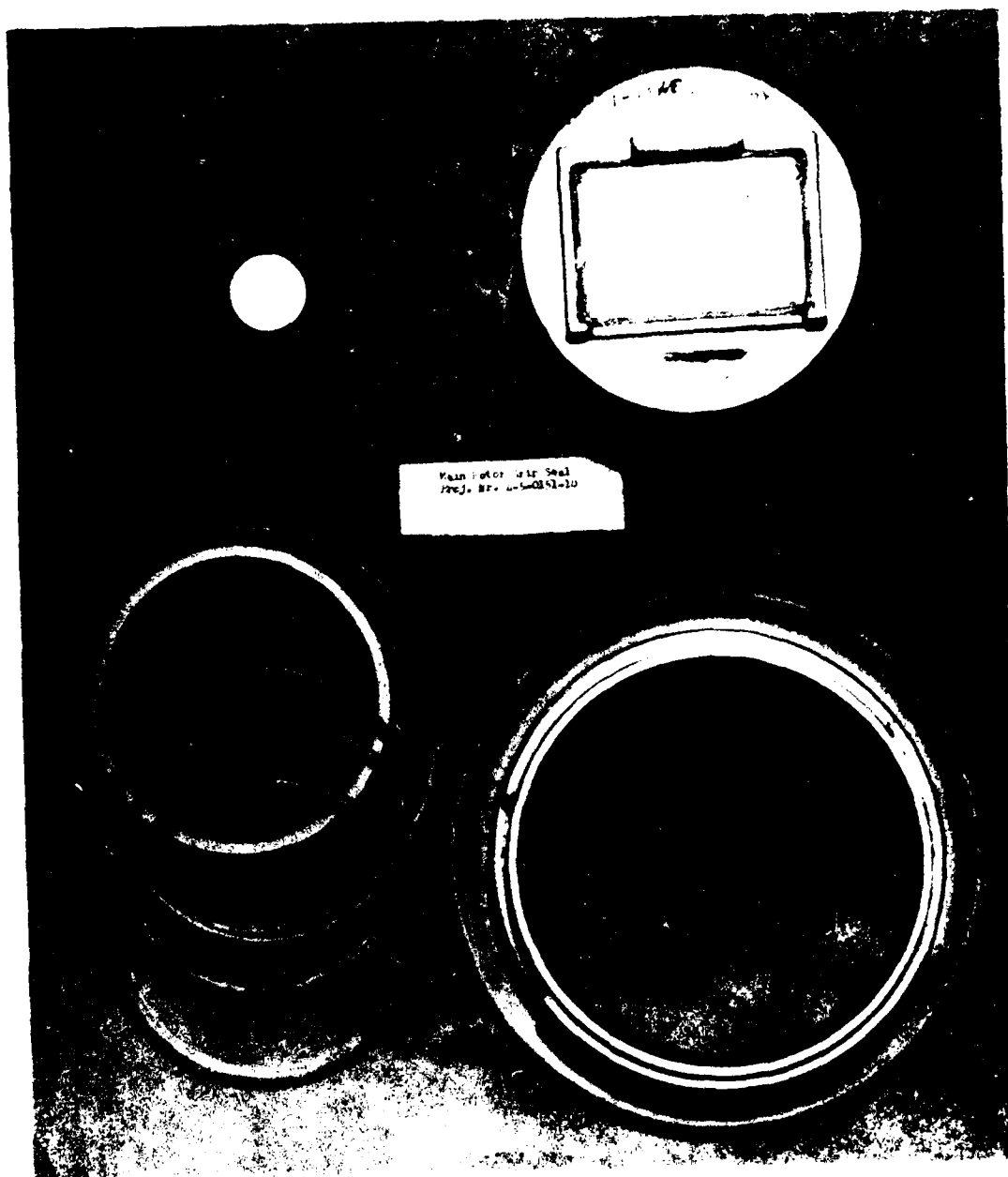


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Photograph

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Modified Main Rotor Grip Seal

INCLOSURE